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AN ESSAY ON THE PAST AND PRESENT STATE OF FORTIFICATION IN EUROPE.

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So many works have appeared from time to time upon the subject of fortification; so many systems, as they are called, have been brought forward confidently by their projectors; so much knowledge of the science has been gradually, yet surely, diffused among the officers of the British service, that a regular treatise on the art seems scarcely to be called for. But, on the other hand, an impartial review of the past and present state of military architecture is yet a desideratum. We have been, like most European nations, too much disposed to follow implicitly the great French writers, and, in doing so, to slight or entirely set aside many illustrious engineers of other countries, who, nevertheless, possess strong claims to notice. It is our wish to contribute, in however small a degree, to the supply of this deficiency; and we propose, therefore, to put together a few facts which may be less generally known to the profession, and, as they pass in succession before us, to offer such remarks on them as their nature may suggest.

The application of gunpowder to the purposes of war, which occurred in the fourteenth and succeeding centuries, effected a sudden, but by no means a total, change in the existing defences of places. It became necessary to dispose broad earthern ramparts for the reception of cannon behind the thin walls which had hitherto defied the rude missiles of antiquity; and those walls themselves, being found inadequate to resist the shock of artillery, were replaced by well-rammed parapets, in which the shot buried itself, instead of, as before, bringing down the masonry, or dashing its fragments among the defenders. The batteries of the besieger, also, soon inculcated the necessity of lowering the parapets and their retaining or revetment walls, in order that they might be concealed, as much as possible, behind the counterscarp; from the previous neglect of which precaution the assailants had hitherto been enabled to choose their own distance for breaching.

But, with these alterations in the protecting enclosure of strong places, ended, for a considerable time, all improvement in fortification. The tracing, or ground plan of the enclosure itself, remained unchanged. Fortified towns were at that time almost universally surrounded by polygons, regular or irregular, having at their angles strong towers, commanding the ground in front, and flanking the adjacent walls and ditches. These enceints manifestly present the rudiments of our modern method; the sides of the polygon being the curtains, and the towers gliding, as it were, into the bastions of the subsequent constructions.

Folard, in his Polybius, ascribes the invention of bastions to a Turk, Achmet Pacha, who, having taken Otranto in Italy, fortified it in such a manner, (according to Guillot, the historian of Mahomet the Second,) as long after to excite the admiration of engineers; one of the most distinguished of whom, Trivultio, declared that it was worthy of becoming a model to every military architect in Christendom. But as Otranto was taken by the Turks in 1480, and as we have evidence of a spacious bastion having been built for the defence of Turin in 1461, it appears, upon the whole, most probable, that the manner in use before the invention of powder came originally from the East, and was of very high antiquity; but that what is called the bastion system, being a consequence of that invention, derived, like it, its source from Europe.

There seems, then, to have been a period of transition, extending over above a century, during which the art of fortifying remained pretty nearly in a stationary condition, and towards the end of which we find Piedro de Navarrà, a Spaniard, and La Fontaine, a Frenchman, employed by Louis XI., upon the French fortifications; while in Germany appeared the celebrated work of Albert Durer.

Although the contemporary of Michael Angelo, Leonardo da Vinci, and Raffaelle, Durer was justly considered one of the greatest men of his time. He was well skilled in painting, engraving, statuary, architecture, optics, and geometry; wrote several good treatises on these subjects, and enjoyed, as he merited, general patronage and esteem. But he had never possessed the advantage of military experience, nor enjoyed opportunities of superintending great defensive constructions. We, therefore, cannot but admire that creative genius which enabled him, in spite of such powerful causes of discouragement, to place war and its events so faithfully and so vividly before us.

As in Bacon's works are to be traced the germs of many modern discoveries in science, so did Albert Durer advance principles which are to this day recognised by the best of his successors. As an instance: he contends that every bastion ought to possess the capability of defending itself in front, flank, and rear, with the double view of overawing the inhabitants, and securing a safe retreat for the defenders of the breaches. This is also one of Choumara's principal objects. Again: it was one of his favorite projects so to arrange the plan of the fortress, that, at every point of attack, a superior number of guns

might be brought to bear upon the besieger. Here may be recognised an important principle of Montalembert and others. Further, we have in Durer's book distinct descriptions of the close defence of the ditch by means of caponnières and detached walls; the latter so much advocated by Carnôt, and extensively employed by the Prussian constructors of the present day at Coblentz and other places. He was also the first to propose a system of counter-arches for increasing the efficiency of revetments, a method produced as new in modern fortification, and very recently employed in rebuilding the breach which the French mine had made in the Lunette St. Laurent. We will go farther, and affirm that the circular system, which has had so many supporters, was first derived from Durer, to whom the idea may be said to have partially descended in the round towers of his predecessors. And this leads us to a remark, which here forces itself upon our notice; namely, that all circular constructions, except in very peculiar localities, are but retrograde steps towards the faulty defences of former times. In proportion as the curved line is adopted, so is the flanking defence of the ditch sacrificed. If, as maintained by its supporters, the object be to secure such lines from enfilade by ricochet, the advantage, after all, can be but trifling and temporary, since, as long as the choice of position remains in the hands of the besieger, he can still silence their batteries by slanting, reverse, or even direct fire. This does not, however, apply with equal force to casemated batteries.

For the reasons we have here given, and also because he is the only writer who gives us a just idea of the transition period of fortification, Durer's book, entitled "A Few Directions for the Fortifications of Towns, Castles, and Small Places," will always be an interesting study to the military reader.

However the precise date and name of the inventor of bastions may be disputed, the Italian States of the fifteenth and sixteenth centuries were unquestionably the true originators of the bastion system of modern times in Europe. Engaged in constant predatory wars, the necessity of good fortifications was every day, as it were, brought home to them, while their great wealth and commercial importance enabled them, above all other people, to encounter the vast expense of their construction.

The leading distinction between our modern systems and the early Italian fortresses, as the latter are described by Marchi and Tartaglia, and exemplified at Milan, Verona, Padua, Turin, &c., &c., consists chiefly in the flanks being perpendicular to the curtain, (by which a proper defence of the face of the next bastion is materially lessened,) and in that defence being partially restored by the now justly exploded resource of a second flank in the curtain. Yet it is worthy of remark that where two bastions chanced, by the nature of the ground, or an original fault in the tracing, to be at too great a distance from each other to afford an efficient reciprocal defence, and that, to remedy the defect, an intermediate one was built, it was usual for the engineer to direct its faces upon the curtain angles of the adjacent bastions thus, in the same construction, by the same architect, frequently exhibiting both the error and its correction.

The Italians were in the habit of applying double flanks to their bastions, under the appellation of high and low, or upper and lower flanks. Flanks of this kind have been long discontinued, because the lower ones were commanded from the crest of the glacis and covered way. Because the shot of the besieger, striking the masonry of the adjoining curtains and high flanks, detached splinters and caused casualties; because shells falling in such confined spaces did great mischief; and because the smoke of the guns discharged from the upper flanks, frequently collected and hung upon the lower so as to obscure the view of the artillerymen. However, it was also occasionally the custom of the times to vault over these low flanks, thus in some degree obviating the above objections, with the exception of that arising from the superior position of the covered way. It is true that these vaults or casemates, being of insufficient size, and, moreover, badly ventilated, became in consequence untenable after a few discharges. They were also sunk too low, and were thus liable, as already mentioned, to be plunged from the covert way. But it is a fair question, since these are faults of specific construction rather than of principle, whether the method has not been somewhat too hastily abandoned. It is an advantage not slightly to be relinquished, that of retaining a double tier of fire to oppose the besieger's counter-batteries, and interrupt his passage of the main ditch. Chasseloup de Laubat, so highly appreciated by Napoleon, and deservedly esteemed by his contemporaries, has in some measure obtained the results of low flanks to the bastions, by making his tenaille with flanks, and placing casemates in them. Yet if, as there is good reason to conclude, these casemates, limited as they are in extent and sunk in relief, when compared with those which the flanks of the bastions are capable of receiving, still promise to be effective in the last operations of the defence, how much more are they likely to become so in the flank of the bastion, covered by the tenaille, and raised to a level nearly with the covered way. We shall have occasion to return to this when discussing Bousmard's method.

The Italians generally built their scarp revetments so high as to meet the superior slope of the parapet; and as Vauban has likewise adopted this disposition in part of what is called his third system, (the latest and by many the most esteemed of his productions,) it seems no more than a just tribute to his memory to offer a few passing reflections on its relative advantages and demerits. It is generally objected to such revetments for a scarp, that, being seen above the crest of the glacis, the besieger has it in his power to batter the exposed part from any distance that may suit his purpose, and that the fall of the masonry involves that of a considerable portion of the parapet. A further exception is made on the score of expense; and it was also feared that the splinters from the wall, being driven inwards by shot, would add considerably to the losses of the garrison. On the other hand, it cannot be denied that they increase very materially the difficulty of escalade, and the space

gained, that is, from five to nine feet, may, in particular situations, be found of great value. For instance, where fortifications are to occupy a narrow slip of land contained between water on the one side and the houses of the town on the other; for then, by reveting the inner slope of the rampart, and using these high scarp walls instead of a slope, on the exterior, a breadth of from twelve to twenty feet would be saved, which, applied to the terreplein of the rampart, would probably be the only available means of giving a proper dimension to that important point. With respect to the first objection, it might possibly be obviated, at least at points where space was not of such paramount consequence as we have just supposed. The thickness of the parapet, for example, might be increased by the breadth of the base of its exterior slope, and thus be made to meet the scarp revetment continued upwards. Supposing such a revetment to be destroyed by the besieger, its fall would still leave the exterior slope at an angle of 45°, that is, in the same condition as it now exists in most fortresses. It is probable that he would hesitate to waste his ammunition for such an unsatisfactory result, and if that were the case the garrison would still retain this obstacle in the way of an attack by main force. With regard to expense, that must always be a question of relation between the means of the constructors and the benefits derived. As to the danger from splinters, we do not contemplate that it can be much insisted upon, when we look round and see how prevalent is the custom of reveting the cheeks and necks of embrasures, parts so much nearer to the gunners than is the escarp.

The early Italian engineers deprived the flanks of the bastions of two-thirds of their length in order to form orillons, thus reducing the actual flanks to most insignificant dimensions. Although the orillon was much improved afterwards both by Vauban and by Coëhorn, especially by the latter, in whose system it seems to acquire a new value, yet, generally speaking, it has never overcome the objections raised against it; and it is probable that its great expense—the encroachment upon the interior of the bastion caused by its retired flank—its exposure to reverse and vertical fire—and the very limited number of guns it was capable of covering, consistently with a due regard to the proper length of the remaining flank—have consigned this work to deserved oblivion.

We find cavaliers in many of the strong places constructed according to the systems of which we are now treating, namely, the Italian; but they are weak indeed and contemptible compared with those formidable works which have since been recommended by Cormontaingne and Carnôt. Unreveted and without ditches, they served only to block up the interior of the bastions and to cramp the exertions of the garrison at the breaches; they could, therefore, have offered but trifling opposition to any, save an attack by main force.

The fortifications of Badajos and of the citadel of Antwerp are examples of the Italian method as it was applied by the Spaniards. The latter never, we believe, adopted the second flank. The revetments of Badajos are mostly of the same description as those in the reduits of the demilunes of Neu Brisach, with the additional defect, that the counterscarp is in many places too low, so that the scarps are at such points seen nearly to the foot.

We must not dismiss the system without pointing out that, even at this early period, galleries of countermines were employed, and that our modern method of subterranean defence is rather an improvement upon these original ones than a new invention. The scarp gallery was usually in the thickness of the revetment, was about five feet high, and was so built as to admit of branches being driven out in any direction to meet the besieger's miner, and stifle or bury him.

This method travelled to Germany and France as well as to Spain; and since the Germans lay claim to some original merit on behalf of their countryman Spekel, as having improved upon it in the former country—the claim, moreover, appearing to be well founded—it would be unfair to pass him over unnoticed.

Spekel was in the service of Maximilian II., and like Montalembert was a captain of cavalry. He applied himself energetically to the study of military engineering, and gradually became so distinguished that his advice and opinion were eagerly sought after by many States. He assisted at the seiges of Malta and Goletta, of Vienna, Syget, Jula, Nicosia, and Famagusta; consequently, must have acquired a great deal of practical knowledge and experience in such operations. He published in 1589.

Spekel seems to have been the first to recommend that the flanks should be perpendicular to their lines of defence, an important change in the art which is almost universally admitted in the present day. He likewise lowered the scarp revetments so as to conceal them from view until the besieger had pushed his approaches and lodgments to the crest of the glacis. He placed cavaliers in his bastions, which are considered by the Germans peculiarly strong; but being unreveted, very high, and consequently much exposed, it is probable that they would be rapidly crushed by the tremendous direct fire of the modern attack. He arranged a close defence of the main ditch by means of a loop-holed gallery in the faces and flanks of the bastions, and likewise by means of the faussebraie, of which work, with all its merits and its faults, he was one of the earliest proposers.

Instead of reveting the counterscarp of the main ditch, he suggests that it should be cut in terraces to save expense. We purpose in another place to consider whether this suggestion of Spekel's may not be extended so as to contribute to an improved defence, by facilitating those offensive returns of the garrison to their captured outworks, which Carnôt, has since so powerfully recommended. He points out the propriety of planting these terraces with shrubs, so that their roots may form so many impediments to the besieger's lodgments; this plan is still considered judicious and acted upon where practicable, as for instance on the glacis.

Spekel is said to have been the first to use artillery from the covered way, and to indent that work so as to lay open every part of it to the defensive fire of

the garrison.* This indenting of the covert way was afterwards adopted by the French successors of Vauban.

This writer traced his ravelins with flanks, and discusses the advantages of constructing interior retrenchments for the purpose of prolonging the defence and disputing the possession of the bastion of attack after the assailants have succeeded in penetrating into it. The reader will not fail to discover considerable merit in this author, particularly when the remote period at which he wrote (1589) is taken into account. On the other hand, his system of retired flanks to the bastion encroach upon it to such a degree as materially to lessen its efficiency, while his proposal for curving the faces of that work, although it has since met with ingenious advocates, is, we believe, rejected by the best modern engineers, for the reasons already given, when noticing the circular system of Durer.

While the science was making such advances in other parts of Europe it languished for nearly a century in France, to which country it was destined aftewards to be so deeply indebted. About the middle of the sixteenth century Catherine de Medicis had invited the Italian engineers, Campi and Castriotto, into France, but they have left no traces of having exerted any very immediate or direct influence upon the progress of the art; for many of the fortresses of that country, even so late as the end of the sixteenth century, were of such feeble construction as to be taken by the petard; and Sully informs us, that in 1586, Henry IV., while carrying on his wars in Poitou, owed the surrender of the greater part of its strong places to the mere noise of five or six guns which accompanied his army. Henry applied himself to remedy the deficiency. Sully, his prime minister, grand master of artillery, and director of fortifications, took the control of military constructions from the municipal corporations, in whose hands, as may be imagined, the art of defence was not likely to receive much enlightenment, and intrusted it to the care of a body of military officers, selected for their talents and experience. This was the beginning of the French corps of Royal Engineers, which, even in its infancy, produced a man whose name is well known to Europe, Errard de Bois le Duc, or as the Germans call him, Errard von Herzogensbusch.

Errard is by many of the French writers considered to be the founder of their school, because he endeavored to oppose the ascendency of the Italians and to establish the art in his native country upon foundations of its own. But although he wrote at great length, his value is said to have been chiefly as a man of practical activity and power of applying his means to varied circumstances of situation. He has laid himself open to much animadversion, by making the flanks of his bastions perpendicular to the faces, so that, in most cases, a line at right angles to them struck the curtain. This evidently weakened the defence of the bastions, with their ditches, covered way, and glacis, even more than in the Italian method, to which his successor Deville quickly returned.

Errard constructed part of the enceint of Doulhens and the whole of the citadel of Amiens. Some of the outworks of Montreuil were also by him, as well as the old castle at Etaples, together with the fort built for the defence of the reverse of the Downs at Calais, and its batardeau.

Deville, having returned to all the errors of the Italian school, claims little attention. He served under Louis XIII. (who commanded in person) at the seige of Hesdin, a place fortified by the Italian engineers forty years before Errard wrote, and having altogether so modern an appearance that it has frequently been mistaken for the work of Vauban. At this siege, where Louis was attended by the Cardinal de Richelieu and the grand master of artillery, de la Meilleraye, it is a curious fact, that, although the besiegers possessed thirty pieces of cannon, they preferred opening the two bastions of attack by the mine, notwithstanding the difficulty which a wet ditch placed in the way of the miner—showing that the service of siege ordnance was still in a very imperfect state at the epoch of this siege, namely, 1639.

At the close of the sixteenth century, the Dutch had been driven to improve the defensive art by circumstances somewhat analogous to those which had created it in Italy. Urged to madness by the gloomy bigot Philip II. and his savage lieutenant, Alva, who boasted that in five years he had delivered over 18,000 heretics to the executioner, this brave people at length rose and expelled their persecutors. Forced, by the inferiority of their means, to act upon the defensive, fortification became the vital resource of the country; but, having neither time nor means to raise the costly ramparts of the Italian states, the genius of their great leader found a substitute in the willing enthusiasm of an oppressed people, struggling for their liberties. Dispensing with the expensive revetments used by the other nations of Europe, the Dutch were obliged to content themselves with facings of turf or fascines to their works; and, as the nature of the country, by facilitating the formation of wet ditches, was favorable to such a construction, and guarded it against a *coup de main*, they were enabled to make such stout defences behind these works, which appeared to have little more than a field profile, that the method rose rapidly in general estimation, and became considerably in vogue in other countries.

But after the spirit which gave life to these gallant defences had had time to cool, Louis XIV., during his war in the Netherlands, reduced the strong towns with such rapidity as to lessen the previously conceived idea of their capability of resistance; and this early Dutch method, which had been well adapted to the exigencies of the time by Freytag, who wrote in 1630, sunk into disuse as quickly as it had risen.

Freytag was in favor of the faussebraie, which formed part of his constructions, and which certainly loses part of its weakness where it is possible to have wet ditches, inasmuch as surprise is, under such circumstances, far less practicable. But it still remained liable to the objections which have long been urged

* The invention of the covered way, or corridor, as it was at first called, is ascribed to Tartaglia in 1554.

against it, among the most forcible of which probably are, its inferiority of command, and the power which it gives to the besieger, after forcing his way into it, of spreading along its terreplein, and mounting the parapet of the body of the place wherever accidental dilapidations, or the weakness of the garrison at that point, may render such a measure advisable.

Freytag's, in common with most of the Dutch methods, is particularly exposed in winter, when the wet ditches are frozen; and every one remembers a remarkable instance of the circumstance being taken advantage of, in the surprise of Bergen-op-Zoom by the force under Lord Lynedoch.

In France the Count de Pagan now endeavored to combine the advantages, while he rejected the errors, of the Dutch and Italian engineers. In this he was eminently successful; and the principles which he has developed really form the basis of those immediately afterwards put forward by Vauban, with whom (as a fortifier of places only, be it well understood) he has been judged worthy of being compared.

Pagan is universally represented as a man of very superor talents. He rose rapidly in the service, and at the age of thirty-eight had attained the rank of Maréchal de Camp; when, having the misfortune to become blind, he was compelled to relinquish his brilliant prospects, and from thenceforth devoted the remainder of his life to science. Besides his treatise upon fortification, which contains many matters worth studying, even at the present day, he has also left several works upon mathematics.

Pagan followed Spekel in tracing the flanks of the bastions perpendicular to their lines of defence. He made the bastions more spacious and formidable, shortened their lines of defence, and raised a species of cavalier within them which is capable, in case of need, of being converted into a good entrenchment. He describes and recommends horn-works, crown-works, and counter-guards, which have only this defect, in common with those of Vauban, that their interior affords far too much space for the lodgments of the besieger. He fell into the mistake of his predecessor, in advocating the formation of triple flanks to the bastion; but, upon the whole, seems justly entitled to be considered as the true founder of what is called the French school.

Less than thirty years after the promulgation of Pagan's system in France, Rimpler, a Saxon, wrote upon the art in Germany; and his ideas deserve attention, not only on account of a certain originality which they possess, but because in them is very clearly to be discovered the groundwork upon which Montalembert more recently based his celebrated and much discussed method.

Rimpler also lays claim to our respect, as having long studied his art in the best of all possible schools, that of experience. He went, with a German contingent, in 1669, to assist the Venitians in defending Candia against the Turks, during that famous siege which offers one of the brightest examples in the history of brave defences. The emulation of the different nations composing the garrison, added to the religious character of the contest, caused every inch of ground to be obstinately disputed, one outwork having been taken and retaken thirty-six times, with a loss to the Mussulmen of 25,000 men. But, unfortunately, the works were not of a nature to give due support to their heroic defenders. Small strangled bastions, traced according to the weakest of the Italian constructions, cramped the garrison in their efforts at the breaches, and, at the same time, made the missiles of the Turks doubly destructive. The garrison, which, including reinforcements, had altogether numbered 30,000 combatants, was at length compelled to surrender; but it was after a noble defence of twenty-four years. It was after inflicting a loss upon the barbarians of 100,000 men, and not until the force of the defenders was reduced to 500. In such a siege, a man of sense and observation, as Rimpler is admitted to have been, must have acquired many valuable materials for after thought; and he had subsequently opportunities of maturing his ideas upon the subject at the sieges of Philipsburg, Bonn, Riga, Bremen, Dansberg, Nymeguen, and Bommeln.

Founding his opinions upon what he had witnessed on these occasions, Rimpler is a decided advocate for the tenaille system, of which he is, we believe, the original proposer, and in which he has been followed and improved upon by Montalembert. He works out very minutely the principle of enabling each bastion tenaille (such is the term he employs) to hold out separately, after the main breach has been carried. To effect this, he detaches those works from the town by broad and deep ditches, covered, during the early part of the siege, with strong beams, planks, and earth, so as to permit the free ingress and egress of the garrison. As the assault of the breach draws near, this covering is removed, and made use of to form blindages for the guns. Shell-proof cover is also provided in every tenaille for the defenders and their stores. Lastly, there are two interior batteries in each tenaille, with powerful casemates looking towards the town, and these are to contain artillery, secure from vertical fire, until the time arrives for their employ in the defence of the respective tenailles as separate forts.

Rimpler wrote in 1671, and fell while conducting the defence of Vienna against his old adversaries the Turks, in 1683.

The years 1633 and 1634, which gave birth respectively to Vauban are to Coëhorn, are two very interesting dates in the history of fortification; for after an impartial review of the merits of these illustrious contemporaries and rivals, it would be difficult to point out any, either before or since their time, who deserve to be placed on the same level with them. Yet, in naming these two engineers together, it is not possible to draw a parallel between them, nor compare them with each other in all respects; for if Coëhorn has struck out more novel details for the minute defence of particular points, Vauban has, on the other hand, displayed more versatility and comprehensiveness in his art, and in the application of it to every circumstance and accident of the ground. Leaving for the present, therefore, their pretensions balanced, as regards exclusively the defensive part of the science, (which may well be conceded by Vau-

ban's renown,) we must nevertheless own the superiority which the countrymen of the latter assert for him on the ground of the great improvement which he introduced into the then existing mode of besieging places, which enabled him to take Coëhorn himself at the siege of Namur, and which have given a preponderance to the attack that not all the efforts of his successors have been able to destroy. Vauban's fame, moreover, will always rest upon sure grounds, when it is remembered what exactitude he was the first to give to the practice of defilading, a branch of the science which, up to his time, had depended upon very uncertain principles, but which he not only reduced to fixed and well-defined rules, but invested with a distinct and scientific character. Neither has Vauban had any equal in the genius and military *coup d'œil* which he so frequently manifested in securing his works from enfilade by judicious tracing alone, saving, thereby, the great outlay which would have been rendered necessary by the alternative of giving increased relief to the works commanded.

Coëhorn's ideas upon fortification are conceived with an especial view to the peculiar marshy soil of his country. Hence he assumes, in his first system, that water rises at four feet below the surface of the ground; in his second system, at three feet; and in his third, at five feet.

In this method the bastions and ravelins are reveted, and are connected by a broad terreplein, (just raised above the level of the water,) with a species of faussebraie, which he calls the low bastion and low ravelin, and which is entirely of earth. The defence of this connecting terreplein (to which he gives the name of "dry-ditch") is secured by powerful cross-fires, partly proceeding from a casemated gallery which occupies the reverse of the faussebraie, partly from covered caponnières built on that part of the capital which unites the saliant of the high work to that of the lower. But not satisfied with this, Coëhorn places similar caponnières in the demigorges of the ravelin, to assist, with those at the saliant, in defending its dry-ditch; while, for the further protection of the faces and flanks of the bastions, he commands the dry-ditch of the former from six casemates situated in a great tower of masonry at the shoulder of the low bastion; and of the latter with guns mounted on ship-carriages, and placed in vaults built to receive them close to the curtain angle. The low bastions are covered in front by earthen counterguards. The ditches are wet, and the main ditch is defended by the fire of three flanks, namely, that of the high or reveted bastion, that of the faussebraie, earthen, or low bastion, and, lastly, by that of the flank with which he has traced the tenaille. Sunken galleries, covered by blindages, and placed in front of the re-entering places of arms, supply an advanced fire of musketry upon the sections before the counterguards and ravelins. These galleries, filled with steady riflemen, would not fail to have a powerful influence on the defence as soon as the approaches came within range of that arm.

The great towers at the shoulders of the low bastions, already alluded to, form, in fact, a species of casemated orillon. They answer the double purpose of containing cannon for the defence of the dry-ditch of the face of the bastion, and of forming a passive defence, which is of two kinds: the one, by their height and position, to cover the dry-ditch of the flank from enfilade; the other to throw a difficulty in the way of the besieger, should he resolve upon breaching the bastion at its shoulder. To effect this latter object, the tower is made to rest upon three parallel ranges of counterarches, bound together by strong counterforts; the front range arched overhead, the other two towards the place. This great quantity of masonry is likewise a serious impediment in the way of the miner, should that mode of attack be resorted to; and, at the same time, every facility is afforded to the miner of the garrison, by means of portions of dry wall at intervals, which enable him to break out rapidly and without noise, to anticipate the operations of his adversary. All this masonry would have to be cut through or blown down, with shot or shell, before any practicable breach could be made in the shoulder of the bastion.

The battery for effecting such a breach would probably be constructed in the dry-ditch of the ravelin, near its demigorge, aided by another at the reverse of the re-entering place of arms firing through the opening between the counterguard and the ravelin. If we consider the difficulty of rendering such a breach (composed almost entirely of masonry) of easy ascent; if we reflect that the besieger has to work his way across a wet ditch fifty yards broad to reach the foot of this breach, exposed the whole time to the fire (more or less dimished, however, by vertical and ricochet) of a triple tier of flanks, we are compelled to admit that Coëhorn has added in a very material degree to the defence of this particular point. Supposing the besieger, on the other hand, to neglect the towered orillon, and to breach the face of the bastion, either from the crest of the glacis of the counterguard, the countergard itself, or down the ditch of the ravelin, he will, on mounting to the assault, find himself taken in flank by the cannon under the orillon, and by the musketry of the caponnière at the saliant; while a row of palisades opposes his farther advance, and his rear is exposed to a close and deadly fire from the loop-holed gallery which extends along the inside of the low face. Assuredly, were it not for the means which the batteries of attack supply for injuring these defences before the storm, a lodgment under such a fire would be impossible.

It may be interesting to point out the peculiar mode of construction adopted by Coëhorn for the covered caponnières. Their floor is made three feet lower than the level of the water in the ditches, and their interior is lined with cement like a great cistern; so that when the defenders are eventually driven out of it, they, in retiring, draw a plug which admits the water from the ditch, and leaves the work no longer in a condition to be serviceable to its new occupants.

It is believed that these covered caponnières are defectively constructed, and that they would soon be destroyed by a heavy fire of mortars. Indeed, it is

"But can we suppose a variation of fifteen minutes in the hour of observation? The author says, it was asserted by some engineers that large shells bursting near them, even, would crush them. But this evil might be remedied, supposing the system in other respects to deserve it, by building the vaults of greater strength, or protecting those already built by blindages and gabions, as soon as the fronts of attack were known, and ought not to be urged as a fatal, or even an important, objection to the general merits of the construction.

If we now compare this system with that of Vauban, even as the latter has been improved by Cormontaigne and the French school of Mezières, we are induced, after a candid examination, to assign the superiority to the Hollander. In attacking the hexagon of Cormontaigne, and indeed polygons much superior, three zig-zags of approach along the capitals, namely, towards the two demilunes and centre bastion, have been always considered sufficient; while Bousmard, in his summary of attack upon Coëhorn's hexagon, uses five sets of approaches, that is to say, towards three ravelins and two counterguards. Here, then, is an advantage in favor of the latter system, as regards the amount of labor, exposure of working parties, and strength of covering parties, as five to three. Also, if trench cavaliers are employed, there must be the same relative proportion, or as five to three. Nor can it be admitted as a set-off against these circumstances that the first parallel is nearer to the covered way, and consequently, that the approaches, although more numerous, are shorter; for this very proximity of the first parallel is a necessity imposed upon the besieger by the nature of Coëhorn's construction, and is in itself a considerable disadvantage to the former, because it places him more within reach, both of the sorties of the garrison, while breaking ground and erecting his first batteries, and of the fire of the covert way, which the great breadth and freedom from traverses of that work permit to be armed with artillery.

It is also to be observed, that in order to get under the fire of all the works which bear upon the attack, it is necessary to enfilade thirty-four lines in this system, and it is easily to be seen that the tracing of so many batteries, supposing the ground to permit such an arrangement, would add to the difficulties of the engineers, especially as the actual extent of the batteries, in mere length of parapet, must be at least doubled, and with it a consequent increase either of time or working parties, and also of danger, incurred. In Cormontaigne only twelve or fourteen lines have to be enfiladed.

But what we cannot but esteen the most important consideration in forming our judgment upon the respective strength of the two systems, is, that in the mode of attack proposed it is considered indispensable to place in battery, on the *crest of the glacis*, no less than 140 pieces of artillery. When we recollect that between forty and fifty are generally thought sufficient, in the same position, to open the way into a fortress of Cormontaigne's; when we reflect upon the number of embrasures which are to be cut and reveted with gabions, the quantity of splinter proofs and other traverses which must be made, and upon the consequently great force of sappers necessary to execute the work in any thing like a reasonable time, we must feel that Coëhorn has thrown an additional onus, of no contemptible nature, upon the shoulders of his assailants; and, to increase the difficulty, Bousmard requires that the batteries shall be of that kind called elevated, in order that their fire may have a due effect in cutting through the earthen works with a horizontal fire of shells. As the whole of the earth for the parapets must be obtained from excavation, in rear of the line of gabions forming the crowning, and not from a ditch in front, the besieger must either replace the earth so obtained, in order to raise the guns to a proper level for firing, or he must form his parapets with materials brought from the rear. All this demands an amount of labor, and scientific labor too, which will be better appreciated from the facts that each gun, mortar, or howitzer would require at least fourteen feet of parapet, or altogether, for the 140 pieces, 1,960.

Work of this description cannot be executed by common laborers of the line; experienced sappers are indispensably necessary. If we allow one man per running foot of parapet, and provide four reliefs of the working parties, in order that the requisite time may be allowed them for repose; if, also, we suppose one-fourth of the operation to be in progress at the same time, 1,960 sappers would not be more than sufficient, particularly as we have made no allowance for the other works going on by sap or mine, while the batteries are constructing and arming, such as descents or passages of the ditches, nor for casualties likely to have occurred up to this advanced period of the siege. It may assist the reader in drawing his conclusions to remind him that the French, in organizing a force for the attack of the citadel of Antwerp in 1832, allotted eight companies of sappers and miners as a full proportion of that arm to a besieging army of 70,000.

If the besieger were to reduce the amount of his siege equipment, and limit the extent of his attack to two demilunes and a counterguard, or to two counterguards and a demilune, his lodgments on the crests of the glacis of those works would of necessity be extremely bloody, exposed as they would be to a triple fire in almost every direction, from works some of which this diminished mode of attack supposes not to be enfiladed. The great facility, also, which the breadth and security of the dry ditches afford, for the concentration of an immense quantity of vertical fire upon these lodgments, is not to be overlooked.

With all the advantages of the modern attack, therefore, we still conceive that more obstacles would have to be surmounted, to compel the surrender of one of Coëhorn's places, than in the attack of a fortress of the same number of fronts, built according to the method of Vauban or Cormontaigne.

Minno, Baron Coëhorn, was a lieutenant general, and also inspector of artillery and fortification to the Dutch republic. It is to be regretted that we have no complete specimen of his mode of construction; the fortresses of Manheim, Bergen-op-Zoom, Nyme-

guen, Breda, and others, presenting only fragments, as it were, of his first system, which is that to which we have confined the preceding observations.

Coehorn was followed in Holland by Landsberg, who, as he himself candidly admits, borrowed his best ideas from his predecessors, (already noticed,) Spekel and Rimpler. But he certainly has given a forward movement and considerable development to those ideas; and being a man of extensive reading and sound theoretical knowledge, having, moreover, served at sixteen sieges, his opinions, adopted as they have been, in many respects, by Montalembert, Carnôt, and the Prussian engineer, Aster, are entitled to respect.

Landsberg employed the tenaille construction with alternate saliant and re-entering angles, but dispenses, injudiciously it would seem, with the glacis. In place of the covert way he substitutes a kind of counterguard, raised at the saliant as a protection against ricochet, and secured from a coup-de-main by a broad ditch with lunette. In rear of this counterguard is the main ditch, closely swept by musketry from a faussebraie, and likewise furnished with a lunette. There is another ditch between the faussebraie and the body of the place, and for the defence of both a description of flêche is constructed at the re-entering angle, flanking completely those parts, and offering the suggestion, probably, of Montalembert's casemated batteries.

The whole town is enclosed by a circular ditch, which is dug within the body of the place, and is defended at intervals by strong redoubts, in which we once more notice one of Montalembert's adaptations. He uses no revetments except those of turf and fascines, otherwise the expense would render the system impracticable; as it is, it seems to possess many valuable capabilities for sites where water is met with, at depths varying from four to six feet.

[*To be continued.*]

French Army.—The committee on the bill for substituting percussion locks for flint ones in the army heard the Minister of War and M. Tugnot-Lanoye, head of the Artillery Department, at the War Office. The committee, it is said, will propose to extend the plan to a greater number of troops than that fixed by the Government. Several members were present at experiments lately made on carbines of a new construction. One invented by M. Delvigne, an ex-infantry officer, seemed to strike them as worthy of notice. Hitherto, in all the carbines used, the ball was either put in at the stock end by unscrewing the barrel, or forced in above by means of a mallet, the former plan wanting strength, and the latter requiring a troublesome and cumbersome apparatus. M. Delvigne's system consists in sending down the bullet uncovered, and then striking it twice with an iron ramrod. As the bullet is of the exact size of the bore of the barrel, this force is found quite sufficient to keep it firmly in its place. His barrel is rifled, and lately at Vincennes several bullets were lodged within a space of four square metres at a distance of six hundred metres. The common carbine is of no effect at that distance.

COMET OF 1843.

ACADEMY OF SCIENCES, PARIS, APRIL 3, 1843.

M. Arago continued his account of the Comet of 1843.

Since Monday last, the astronomers of the Paris Observatory have been able to obtain additional observations of the nucleus, and to determine the form and position of the nearly parabolic curve in which it moves. M. Arago has also received from his friend Humboldt and others the results of the observations made on this subject in Germany and Switzerland, and has compared all the orbits, confining himself more especially to the perihelion distance.

M. Plantamour has ascertained that his observations of the 28th and 30th March are not exactly represented by the first elements. For those of the 30th, the areas in right ascension and declination amount respectively to 4′ 34″ .5, and to 1′ 25″ .7. "It is therefore necessary," says M. Plantamour in his letter, "to make a slight correction of the elements." Thus we cannot foresee in what degree future corrections may alter the perihelion distance; and it is evident that the conclusions deduced from the distance 0.0045, first obtained by the learned director of the Geneva Observatory, were premature.

On the 24th March M. Encke, unquestionably one of the astronomers most competent in such subjects, had calculated the elements from these observations at Berlin of the 20th, 21st, and 22d. His perihelion distance is 0.0101.

On the 25th M. Galle, of the same observatory, forwarded to M. Schumacher, at Altona, elements calculated from the same observations. The perihelion distance found by him is 0.0113.

On the 25th M. Littrow sent to M. Arago from Vienna, but with an expression of great distrust, elements deduced from observations made on the 18th, 21st, and 23d March. The perihelion distance is given by him 0.5767.

There are evidently here errors of calculation, observation, or copying, since they lead to determinations equally inadmissible of the position of the perihelion and inclination of the orbit.

Agreeably to the elements presented to the Academy to-day by M. Eugene Bouvard, and which have been deduced from five observations at the Paris Observatory, the perihelion distance is 0.00488. Yet even these do not represent the observations with all desirable precision, the discordancies in longitude being from — 20″.8 to + 14″.5, and in latitude still greater, being from + 26″.1 to — 21″.5.

M. Arago then mentioned the elements determined by MM. Laugier and Victor Mauvais. They are as follows, and represent the observations better than any of the others:

Perihelion passage, m. t. Paris, Feb. 1843,	27.42941
Perihelion distance, - - - -	0.005488
Longitude perihelion, - - -	278° 45′ 58″
Inclination orbit, - - - -	35° 31′ 30″
Longitude ascending node, - -	2° 10′ 00″

COMPARISON OF OBSERVED WITH THE CALCULATED POSITIONS.

Excess of calculated above observed positions.

	Longitudes.	Latitudes.
March 18, Paris,	+ 0″.1	0′.0
" 19, Paris,	+ 8″.9	+ 15″.8
" 21, Geneva,	+ 1″.3	+ 3″.7
" 22, Berlin,	+ 1″.3	+ 9″.9
" 24, Berlin,	+ 0″.8	+ 8″.9
" 27, Paris,	— 0″.7	+ 0″.4
" 28, Paris,	— 0″.3	+ 3″.7
" 29, Paris,	+ 12″.1	+ 6″.5

If we regard these elements as definitive, as we are authorized to do, the comet of 1843 has, of all known comets, approached nearest the sun. As it is interesting, a table of least perihelion distances hitherto determined is presented; the mean distance of the sun from the earth (95,000,000 miles) being considered unity.

	Peri. distance.
Comet of 1843,	0.005
" 1680,	0.006
" 1689,	0.02
" 1593,	0.09
" 1821,	0.09
" 1780,	0.10
" 1565,	0.11
" 1769,	0.12
" 1577,	0.18
" 1533,	0.20
" 1758,	0.21

On the 28th March, the diameter of the nebulosity which formed the head of the comet appeared to be 2′ 40″, corresponding to a real diameter of 95,000 miles, and a volume equal to *seventeen hundred times* that of the earth.

At the moment of the perihelion passage on the 27th February, the centre was distant from the surface of the sun only 80,000 miles. If we suppose the volume the same on the 27th February that it was found on the 28th March, we must deduct 47,000 miles (radius of the comet) from the preceding number, in order to arrive at the distance between the *surfaces of the two bodies* at the instant of perihelion passage, and their nearest approach is thus found to have been 33,000 miles.

On the 18th March, the angular length of the tail was 40°; its absolute length was nearly 130,000,000 miles.

The following consequences are also deduced from the observations of Laugier and Mauvais.

Its least distance from the earth was, on the 5th March, which, expressed in decimal parts of the earth's mean distance from the sun, was 0.84, equal, in round numbers, to 67,300,000 miles.

From the 27th to the 28th February, it described 292° of its orbit; and on the 27th, in the short space of 2h. 11′, (from 9h. 24′ to 11h. 35′ P. M.,) it passed through the entire northern part of it.

Its heliocentric latitude varied in a most extraordinary manner; for, half a day before the perihelion passage, this latitude was 31° 04′ south; at the instant of perihelion 35° 21′ north; and half a day afterwards 26° 11′ south; thus passing through 92° 36′ of latitude in twenty-four hours. In the same interval of time, the radii vectores varied from simple to decuple.

It was twice in conjunction with the sun on the 27th; the first time about 9h. 24′ P. M. beyond the sun, and the second time about 12h. 15′. During this last conjunction it was projected on the hemisphere of the sun visible from the earth, and should have produced a partial eclipse; but the phenomenon, even if foreseen, could not have been observed in Europe, as it happened about midnight at the meridian of Paris.

If the length of the tail was as great on the 27th February as on the 18th March, which we have seen was about 130,000,000 miles, its extremity extended beyond the distance through which the earth revolves about the sun. Was it requisite, then, that, at the moment of its second conjunction, we should traverse the tail? It must have been, if its direction occupied the plain of the terrestial orbit, and a variation of 8° in its heliocentric latitude would have led to this curious rencontre. But, in order that this should have occurred from the breadth of the tail alone, that is, if we make no change in the parabolic elements of Laugier and Mauvais, this breadth must have surpassed tenfold that measured, as we see by the following valuations.

The shortest distance of the earth from the axis of the tail, on the 27th February, at the moment of conjunction, was 8,500,000 leagues; the actual semi-diameter of the tail 660,000 leagues, if we take 2° as its angular breadth; and therefore the shortest distance of the earth from the borders of the tail was nearly 8,000,000 leagues. We may add, that the earth occupied the space on the 23d March, filled by the comet on the 27th February; and had this body passed its perihelion twenty-four days later, the earth must inevitably have traversed its tail in its greatest breadth.

The parabolic elements of Laugier and Victor Mauvais show, also, that the tail of the comet could not have been visible in our climate till about the 5th March, by reason of the sun's rays. Before the passage of the perihelion, say towards the middle of February, the height of the nucleus above the horizon, at an hour after sunset, did not exceed 13°, and its distance from the earth was 1.14. Nothing further is, therefore, wanting to acquit astronomers of the reproaches uttered against them, even if these reproaches merited attention.

A glance at the tables of cometary orbits shows that the comet of 1843 is new, or *has never been observed before.* If historians or chroniclers have spoken of it, it has been in terms so vague that its orbit could not be calculated, and it is from a comparison alone of the elements of the orbit determined at two epochs, that we decide whether the body has been observed, and is thereafter to be ranged in the catalogue of *periodical comets.*

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April 10, 1843.

M. Arago communicated the parabolic elements calculated by M. Valz from observations made at Marseilles on the 18th, 27th, 29th, and 30th March, and 2d April. They are as follows:

Passage of perihelion, m. t. Marseilles, Feb,	27.43
Perihelion distance,	0.0052
Longitude perihelion,	278° 50′
Longitude node,	1° 24′
Inclination,	35° 39′

Motion *retrograde.*

M. Arago then read the following extract from a letter of Encke to Humboldt, dated 3d April. The distinguished director of the Berlin Observatory shows here, as we shall see, how he has arrived at the belief that the comet of 1843, in place of moving in an extremely elongated ellipse, describes an open curve of the second order, an *hyperbola.*

"In calculating the Berlin observations upon the hypothesis of a parabola, we find errors of more than forty seconds, and a perihelion distance smaller than the radius of the sun; that is to say, an impossible result. On the other hand, if they are calculated on the supposition of an hyperbolic orbit, the computed places represent the observations so well, that in twenty-two differences none exceed 12″.5 of arc. Four of these differences only exceed 10″; all the others are less. Again: if we adopt an hyperbolic orbit, the comet is, at its perihelion, about one-eighth of its radius distant from the sun. With an hyperbolic orbit the elements are—

" Passage of perihelion, m. t. Berlin, Feb.,	27.49778
" Distance of perihelion,	0.00522
" Longitude perihelion,	279° 2′ 29″.9
" Longitude of node,	4° 15′ 24″.9
" Inclination,	35° 12′ 38″.2
" Eccentricity,	1.00021825

" Motion *retrograde.*

RESULTS OF THE COMPARISONS OF THE HYPERBOLIC ORBIT WITH DIRECT OBSERVATION:

1843.	Right ascension comet.	Calculated position.	Declination comet.	Calculated place.	Difference R. A.	Difference dec.
Mar. 20	45° 42′ 30″ 0	45° 42′ 30″ 7	— 9° 13′ 40″ 0	— 9° 13′ 40″ 0	| + 0″ 7	| + 0″ 0
" 21	47 25 30 0	47 25 36 5	8 56 40 0	8 56 35 5	| + 6 5	| + 4 5
" 22	49 03 27 5	49 03 27 0	8 39 59 9	8 39 49 2	| + 0 5	| + 10 7
" 24	52 04 58 7	52 04 55 8	8 07 27 6	8 07 17 7	| + 2 9	+ 9 9
" 25	53 29 17 1	53 29 14 0	7 51 46 6	7 51 35 6	| + 3 1	+ 11 0
" 26	54 49 33 0	54 49 33 6	7 36 27 6	7 35 18 5	+ + 5 3	+ + 9 1
" 27	56 06 20 6	56 06 24 5	7 21 25 3	7 21 28 1	+ + 3 9	+ + 2 8
" 28	57 19 47 3	57 19 47 8	7 07 04 4	7 07 04 1	+ + 0 5	+ + 0 3
" 29	58 30 04 1	58 30 02 9	6 53 02 9	6 53 06 7	| + 1 2	| + 3 8
" 30	59 37 10 1	59 37 22 6	6 39 45 0	6 39 35 7	| + 1 2	| + 9 3
" 31	60 42 06 0	60 41 59 5	6 26 19 6	6 26 31 1	| + 6 5	| + 11 5

Although the opinion of Encke is entitled to great attention, the astronomers of Paris feel it due to themselves to remark, that the value of the perihelion distance deduced from their observations on the supposition of a parabolic orbit, has never been less than the radius of the sun. They add, that in the arc described by the comet between the 18th March and 2d April, inclusive, (at Berlin it has only been considered between the 20th and 31st March,) the greatest discordancies are in the order of those that Encke has found by adopting an hyperbolic orbit. This will be seen in the following table prepared by Laugier and Mauvais:

Excess of parabolic calculated above observed positions:

1843.	Longitude.	Latitude.
March 18, Paris,	+ 0″ 1	0″ 0
19, Paris,	+ 8″ 9	+ 15″ 8
21, Geneva,	+ 1″ 3	+ 3″ 7
22, Berlin,	+ 1″ 3	+ 9″ 9
24, Berlin,	+ 0″ 8	+ 8″ 9
27, Paris,	— 0″ 7	+ 0″ 4
28, Paris,	— 0″ 3	+ 3″ 7
29, Paris,	+ 12″ 1	+ 6″ 5
April 2, Paris,	— 6″ 1	— 8″ 5

MM. Laugier and Mauvais have examined whether calculable and precise determinations could not be substituted for the vague considerations through which Mr. Cooper has adopted the belief, that the comet of 1843 and those seen by Maraldi in 1702 and by Cassini in 1668 are identical. I present the following extracts from a letter sent to the Academy by them to-day:

"The observations of 1702 are not very definite. Pingré gives in the Cométographie, page 37, vol. 2, a position of the comet determined 28th February, 1702, at sea, in latitude 15° 10′ north, and longitude 116° 45′ east of Teneriffe.

"At the commencement of twilight the comet was 20° 30′ to the west of south, and its height above the horizon 8° 40′; the extremity of the tail being 38° west of south and 48° 50′ high. Unfortunately the time is not accurately given.

"Maraldi (Memoires Academy Sciences, 1,702, page 107) designed on a celestial chart two positions of the tail; one on the 26th February and the other on the 2d March, 1702.

"Adopting the 15th February, 1702, for the time of perihelion passage, we have calculated the positions which the comet of 1843 would have had on the 26th, 28th February, and 2d March of that year. The directions of the tail found by calculation do not agree very well with Maraldi's observations of the 26th February and 2d March, that of the 26th February being least discordant.

"As to the observations made at sea on the 28th February, if we suppose the time to have been 7h. 45′, we shall have as the places of the comet—

	Long.	Lat.	
Observation,	9° 47′	23° 0′	These numbers have been taken from a sphere.
Calculation,	9° 10′	— 23° 51′	

made about the beginning of the first twilight, and twilight commences at 8 P. M.

"Comet of 1668.—Pingre gives in the Cométographie, vol. 2, page 22, two positions of the comet of 1668, which we transcribe.

"March 5, 1668, at 7 P. M., Valentin Estancel, at San Salvador, in Brazil, saw the comet to the west a little above the horizon. The tail had its origin below two bright stars, which are in the back of the whale (η and θ;) it terminated at the stars 8 and 9, (ε and σ,) which are at the lower part of the belly of the same constellation. On the 7th March, the head was a little below and to the side of that star in the whale, whose longitude was 0s. 12° 42′ and latitude — 15° 46′ (θ beyond doubt;) the extremity of the tail grazed ζ of the whale.

"In the memoirs of the Academy of Sciences for 1702, page 107, Maraldi traces on a celestial map two directions of the tail observed by Cassini, at Bologna, on the 10th and 14th March, 1668.

"From these different observations, we have obtained the following positions of the comet.

	Longitude.	Latitude.
March 5, - - - -	4° 19′	— 14° 30′
" 7, - - - -	10° 14′	17° 0′
" 10, - - - -	18° 34′	19° 20′
" 14, - - - -	28° 49′	22° 0′

"The two last places are extremely doubtful, as we have for these days only the directions and lengths of the tail.

Supposing the comet of 1843 appeared in 1668, we have calculated the time of perihelion passage from the observations of the 5th and 7th March of that year.

"The 5th March gives as perihelion passage,

1668, - - - - -	February,	28.3
"The 7th March do.	do.	26.1
Mean, - - -		27.2

"If we adopt this last number, February, 27.2, the difference is very considerable. We perceive that the epoch which best satisfies these observations is February 27, near midnight. Adopting this, then, as the perihelion passage, the calculated places are as follows:

Differences with observation.

	Long.	Lat.	Long.	Lat.
March 5, -	4° 20′	— 14° 27′	+ 1′	+ 3′
" 7, -	10° 36′	16° 59′	— 6′	+ 1′
" 10, -	19° 14′	19° 59′	+ 40′	— 39′
" 14, -	29° 28′	21° 59′	+ 39′	+ 1′

"It is, therefore, doubtful whether the comet of 1843 and that of 1702 are the same, but it is extremely probable that that of 1843 was observed in 1668."

The same conclusions have been arrived at by M. Schumacher, and a circular dated 31st March has been sent by him to all the astronomers of Europe announcing it. M. Peterson, at the request of Schumacher, calculated the observations of Maraldi and Cassini; the more indefinite ones of Martin Brouwer and Valentin Estancel. From this minute examination follows, says the learned director of the Altona Observatory, "it is very possible that the present comet and that of 1668 are identical; the time of revolution is then 175 years."

April 3, 1843.

Thermoetrical experiments made on the Zodiacal Light and that of the Comet, 1843.

Letter from M. Ad. Matthiessen to M. Arago.

If heat is propagated to great distances by radiation alone, the comet sends no warmth to the surface of the earth.

Monday, 27th March, at 8 P. M., a concave mirror, one metre* in diameter, well polished, and with an extremely sensible thermometer at its focus, indicated no elevation of temperature; but when the axis of the mirror was directed to the zodiacal light, the elevation of the thermometer was very sensible.

On the following evening, I placed a very good thermo-electric pile of 25 pairs in a slight hollow between the arc de l'etoile and the Bois de Boulogne, in such manner that it could not be affected by any terrestial object except grass, (within a radius of from 200 to 300 metres,) and a small white house about 800 metres distant, with a single casement to the northeast.

The needle of the galvanometer remained at zero when the pile with its conical condensater was pointed to the pole star. Turning it to the tail of the comet below Orion, it continued at zero. Towards the nucleus it indicated 2°; but the impression of the heat gradually increased in turning it towards the zodiacal light, after having passed the nucleus of the comet. Under the Pleiades, 10° deviation; about the base of the zodiacal light, 12°; above the point where the sun set, 5°. At 9 o'clock the comet gave the same results; under the Pleiades, 8°; base of the zodiacal light, 12°; above the point of sunset, 3°; at 9h. 30′, 7°, 10°, 2°, and the same results for the comet.

To judge of the sensibility of the apparatus, it will suffice to say, that my hand, cold as it was from resting on the humid grass, at the distance of a metre sent the needle striking against a point placed 90° from zero. There was the same result without the cone, the hand being at a distance of one-fourth of a metre from the exterior opening of the pile. The little house heated by the rays of the sun before its sitting, at 8 o'clock, deflected the needle 26°; and at 8h. 30′ to 21°. At that time, the candle which burned at the convent was put out, and the needle descended to 19°. At 9 o'clock it was 13°, and at 9h. 30′, 9°.

With the exception of frequent perturbations caused by currents of warm air, sometimes sensible to the person, the instrument gave the same results in each of forty repetitions.

I was surprised to find the needle remain at zero in all other directions of the heavens, for I expected that oblique portions, where the atmospheric strata is most dense, or portions containing most stars, or finally, that the grass and earth heated all day by the sun would give impressions of heat. We see, therefore, how little heat is given out by elastic fluids, and

* The metre is 3.27 feet.

also that the grass cools rapidly and completely by the humidity of the evening.

The indication of heat being constant towards the zodiacal light, we must ascertain if it arises from an atmosphere which is warmer near the point where the sun sets, (for distant terrestial objects could not influence the galvanometric pile, since it does not face any,) or if it comes directly from the zodiacal light. In this last case the zodiacal zone should be of high temperature, as it is excessively rare.

In taking away the conical condenser of the pile, the zodiacal light gave but 2° or 3° deviation about the base; 1° to the right and left, and nothing for the comet.

The highly refractive and colorless flint glass made by M. Bontenes for the achromatic lenses which I have employed, permits more than three-quarters of the calorific rays coming from a high temperature to pass, but scarcely any from a source below boiling water. The lens is 56 centimetres diameter, with a principal focus of 16 centimetres. Placed before the base of the zodiacal light, the deviation of the needle was augmented; it stopped at 4°. Below the Pleiades it lowered a little, and stopped at 2°. Above the point of sunset it fell to zero.

This result would indicate that the zodiacal light may concentrate itself almost entirely on the pile, whilst the space to the right and left is too extended to produce sensible increase; but it is also evident that the augmentation of heat could not be perceived through the flint glass unless the source was of high temperature. The 5° shown by the experiment with the cone was then produced, in the greatest part, by the warm atmosphere, and was extinguished by the absorption of the flint glass, whilst the 15° near the zodiacal light were principally due to it.

The pile provided with a condensing cone deflects the needle about 15°, when a lighted tallow candle is placed before it at the distance of about 10 metres, showing the minimum quantity of heat radiated by the zodiacal light, and that the influence of the comet on our temperature is actually imperceptible.

ASTRONOMICAL APPARATUS.—We are happy to learn, that the amount of $25,000, which was a short time since proposed to be raised in this city for the purchase of a telescope and other astronomical instruments, is all subscribed. Of the above sum $5,000 were subscribed by one gentleman, $1,000 by another, several sums of $500 by other individuals, $3,000 by the American Academy of Arts and Sciences, and $1,000 by the Society for the Diffusion of Useful Knowledge. A considerable length of time will doubtless elapse, before the principal telescope can be manufactured, but measures we doubt not will be immediately taken for having it in progress without delay. *Boston Daily Advocate.*

LACHINE CANAL.—Upwards of eight thousand laborers will be employed upon the Lachine canal, in Canada, during the approaching season. This great work will probably be finished in two or three years, when vessels of three hundred tons burden will be able to sail from ports on the Atlantic to any of the cities on the great lakes.

HYDROGRAPHICAL OFFICE.

WEATHER JOURNAL FOR THE WEEK ENDING SATURDAY, MAY 27, 1843.

DAYS.		Barometer.	THERMOMETERS. Attach.	Sun.	Rad.	Shade.	W. Bulb.	Dew Point.	WEATHER.	Portion cloudy.	WIND.	FORCE.	Rain, inches.
Monday, 22d,	3 A. M.	29.756	66°	44°	45°	51°	46°	46° 5′	Clear.	-	NW.	Airs.	
Do.	3 P. M.	29.852	67 5′	68	69	67 5′	58	55 5′	Light rain.	1.0	SW.	.26	
Tuesday, 23d,	3 A. M.	29.849	68	51	52	53	50	49	Clear.	-	Calm.	"	
Do.	3 P. M.	29.810	73	84	83	73	58	56	Cumulus.	-	SE.	Airs.	
Wednesday, 24th,	3 A. M.	29.900	69	52	52	57	53	52	Cirrus.	-	Calm.	"	
Do.	3 P. M.	29.930	71	88	89	78	75	56	Cirrus strat.	.6	W. N. W.	.13	
Thursday, 25th,	3 A. M.	29.984	69	58	58	62	57	55	Nimbus.	.8	North.	Airs.	
Do.	3 P. M.	30.036	68	80	83	70	56	43	Cirrus strat.	.6	NE.	"	
Friday, 26th,	3 A. M.	29.948	72	-	54	57 5	55	-	"	-	"	"	
Do.	3 P. M	29.948	72	96	102	77	67	64	Cumulus.	.6	S. SE.	.26	
Saturday, 27th,	3 A. M.	29.938	71	60	61	63	58	55	Cirrus.	.9	NE.	.13	
Do.	3 P. M.	29.924	72	108	106	78	65	60	Cumulus.	.2	NW.	.26	

Maximum variation of the needle, May 24, at noon, 1° 38′ 48″ 75.
Minimum, " 26, at 6 A. M., 1° 24′ 19″ 75.
Mean variation for the week, " " " 1° 31′ 57″ 00.

HYDROGRAPHICAL OFFICE.

WEATHER JOURNAL FOR THE WEEK ENDING SATURDAY, JUNE 3, 1843.

DAYS.		Barometer.	THERMOMETERS. Attach.	Sun.	Rad.	Shade.	W. Bulb.	Dew Point.	Weather.	Portion cloudy.	Wind.	Force.	Rain, inches.
Monday, 29th,	3 A. M.	29.778	69° 5′	57°	58°	61°	57°	56°	Heavy rn.	.10	E. NE.	.26	.95
Do.	3 P. M.	29.786	72	53	53	53	49	53	Misty rn.	.10	N. NE.	.56	
Tuesday, 29th,	3 A. M.	29.820	65	49	50	51	46	50	Cumulus.	.8	NE.	.24	
Do.	3 P. M.	29.866	65	99	110	69	64	56	"	.0	NW.	.13	
Wednesday, 30th,	3 A. M.	29.850	64	51	57	53	48	37	Nimbi.	.3		Airs.	
Do.	3 P. M.	29.908	65	75	78	60 5	51	44	Stratus.	.9	W. NW.	.13	
Thursday, 31st,	3 A. M.	29.904	69	45	44 5′	48 5	39	36	Cum. strm.	.3	NW.	"	
Do,	3 P. M.	30.120	62	82	87	87	59	36	"	.7		"	
Friday, 1st,	3 A. M.	30.277	63	33	31	38	-	-	Clear.	.0	Lt. airs.	Light.	
Do,	3 P. M.	30.336	64	86	93	67	-	38	"	.1	SE.	Mod.	
Saturday, 2d,	3 A. M.	30.126	64	49	52	58	53	-	"	.3	SW.	Fresh.	
Do.	3 P. M.	30.086	71	75	77	75½	70	62	Heavy rn.	.10			.240

Maximum variation of the needle, at 2 P. M., May 29, 1° 38′ 21″
Minimum, " at 8 A. M., May 29, 1° 23′ 16″
Mean variation for the week, " " " 1° 31′ 23″

WASHINGTON.

THURSDAY, JUNE 8, 1843.

THE SANDWICH ISLANDS.

Late arrivals bring a more particular account of the fact we stated some weeks since, that the English had taken possession of the Sandwich islands; upon what pretext we are not fully apprised, further than that it was in consequence of alleged injuries sustained by Mr. CHARLTON, the British consul, from the Government of the Sandwich islands. The seeds of this difficulty, as we learn from private sources, were sown some ten or fifteen years ago, and its history is a perfect parallel to the fable of the wolf and the lamb at the muddy pool. This consul, Mr. CHARLTON, was a hot-headed Englishman, who was hostile and violent in his opposition to the American missionaries there. The first difficulty between him and the young King, Kamehameha, or familiarly "King," as he is there called, commenced about the consul's cow. She one day strayed into the "King's" garden, or committed some other trespass upon the royal premises; she was pelted with stones, or received some treatment on the occasion which greatly offended the consular dignity, and gave rise to bad feelings, and perhaps a dispute, which has increased from one thing to another, until it has cost "King" his throne. The seizure of those islands is a foul usurpation and rank injustice, worse by far than that perpetrated by the French upon the Marquesas.

In a military point of view, the Sandwich are the most important islands in the Pacific. Half way between America and Asia, they are in the monsoon belt on the way side of vessels bound from western America to Polynesia or the East Indies. They are the stopping places for ships trading between the northwest coast and China. They afford commodious and safe harbors, to which our whaling vessels are accustomed to resort for refreshment, and to cooper their oil, break out their holds, refit, &c. Sometimes as many as a hundred sail of American vessels are seen anchored there at a time. An extensive business is done there, one house at Honolulu alone wielding a capital of $2,000,000. These islands will prove an important acquisition to the English at some future day, when New Holland shall take her stand as an independent nation, and American enterprise shall have peopled the western valleys of the Rocky mountains and provided cities on the banks of the Columbia river. Even at this day, our fishermen in the Pacific will suffer from the change; they enjoyed many facilities, which, of course, will be now denied them, for we consider that England has now a hold upon that group, which she will not readily let go. Who but John Bull would go such lengths on account of a cow? That this animal, in the middle of the 19th century, should cost a King his crown, and his people their seven green islands! The following is the touching proclamation of the King when the spoiler came:

Where are you, Chiefs, People, and Commons, from my ancestor and people from foreign lands!

Hear ye, I make known to you that I am in perplexity by reason of difficulties into which I have been brought without cause, therefore I have given away the life of our land. Hear ye! But my rule over you, my people, and your privileges, will continue, for I have hope that the life of the land will be restored when my conduct is justified.

Done at Honolulu, Oahu, this twenty-fifth day of February, eighteen hundred and forty-three.

KAMEHAMEHA,
KEKAULUAHI.

Witness, JOHN D. PAALUA.

SCHOONER GRAMPUS.—A painful anxiety has for some time been felt for the fate of the schooner *Grampus*, which sailed from the Chesapeake on or about the 20th February, under the command of Lieut. A. E. DOWNES, for a cruise on the coast between Cape Hatteras and the river St. John's, in Florida. The latest accurate information that has been received of her, is that she was at Charleston about the 10th of March. A letter from an officer on board stated that he expected to be with his friends again about the 10th of April.

Hopes have been entertained for the safety of the *Grampus* from a report contained in our paper of the 4th ultimo, that she was at Vera Cruz on the 4th of April. This report was copied from some southern paper, in which it was stated to have been obtained from a vessel of war at Pensacola. Had the *Grampus* been at Vera Cruz as reported, she would have been heard from ere now.

There is too much reason to fear that she foundered in the gales that occurred off the coast soon after she left Charleston.

J. HENSHAW BELCHER, Professor of Mathematics in the U. S. navy, was, on the 5th inst., admitted to practice as an Attorney at Law in the District Court and Court of Common Pleas for the city and county of Philadelphia.

ENLISTMENT OF ALIENS.—The Supreme Court of New York, at its recent term, decided that the enlistment of an alien in the army of the United States is not illegal; and cannot, on the ground of alienage, be set aside.

During the absence of the Secretary of War, who left Washington last Friday, the President has appointed SAMUEL HUMES PORTER, Esq., to be Acting Secretary of the Department of War.

THE AMERICAN RAILROAD JOURNAL AND MECHANICS' MAGAZINE has been revived by its former conductor, D. K. MINOR, in connection with his late associate Mr. GEO. G. SCHAEFFER. It is published monthly, on a double sheet of 32 pages 8vo., at the reduced price of $2 for one copy; three copies for $5; seven copies for $10; or sixteen copies for $20.

May its success and popularity equal that of the subject it advocates.

JAMES M. SELDEN, Esq., brother of CARY SELDEN, deceased, has been appointed Naval Storekeeper at the navy-yard, Washington, D. C., in place of Mr. CRUMP, who declined.

The frigate *Raritan* will be launched from the navy-yard at Philadelphia, on Tuesday next.

The Board of Naval Constructors, which met in Washington on the 25th ult., adjourned on Monday last. Mr. BRODIE did not arrive in season to attend the Board.

We regret to learn that CARY SELDEN, Esq., once a cherished member of our community, but for the last twenty-five years a resident of Washington, where at the time of his death he filled the office of Naval Storekeeper, died on Friday night last. He commenced his career in life, forty years ago in this Borough in the pursuit of commerce, and soon after married in one of our most respectable families; but removed to Washington about the year 1815. He was a liberal minded and benevolent hearted gentleman, and held in the kindest regard by those who knew him best.—*Norfolk Herald.*

HINT TO THE BOARD OF NAVAL CONSTRUCTORS.—We see it stated that a board of naval constructors, consisting of Colonel S. Humphreys, F. Rhodes, L. Lenthall, F. Grice, and C. D. Brodie, are to convene at the city of Washington, for the purpose of determining on the models which are to be adopted in the construction of six sloops of war, or 20 gun ships, as they are generally called. Our attachment to the navy, and viewing its great importance to the country, induces us to express a hope that the labors of this board will produce ships of greater efficiency and *faster*, than those heretofore built. 'Tis notorious, that our sloops-of-war have been the *dullest* sailers in our navy, and probably in any other navy. Their great fulness aft *below* the water-line when under a press of canvas, brought a dead weight to *drag* through the water, which necessarily impeded the speed. We knew some little about ships in the days of our boyhood, and always remembered that a vessel with a bluff bow and heavy broad counter and a great fulness aft, could not sail fast. And while we are observing the beautiful and graceful form to give our ships to secure their speed, do not let us forget the great necessity of *increasing* the size of our 20 gun ships, so as to enable them to carry eighteen long 32-pounders, and two 68-pound Paixhan guns. These would be formidable ships, superior to any of the 20 gun ships of the European navies, or the 36 gun frigates of England and France carrying *short* guns.—*United States Gazette.*

EDITOR'S CORRESPONDENCE.

FORT GIBSON, *May* 14, 1843.

Col. MASON starts from Fort Leavenworth about the 25th of May, with C, F, and K companies of dragoons, to be joined at Council Grove by company A dragoons from Fort Scott. The object of this move is to protect the Santa Fe traders, who are coming in this year with large quantities of specie. It is known that banditti calling themselves Texans, but in reality thieves from Missouri and Texas, have organized in large parties, and have gone out to rob the caravans.

Captain BOONE left Fort Gibson on the 14th of May, with parts of companies H and E of dragoons, and all the mounted men of company D followed on the 15th, under command of Lieut. JOHNSTON, to join Captain BOONE. The other officers are Lieutenants CHILTON, BUFORD, and ANDERSON, who accompany Captain BOONE. All the above troops will be absent several months. There are not dragoons enough on this western frontier. One of these commands musters less than a hundred men, to oppose, perhaps, four hundred desperate banditti and wrest from them their spoil.

From the Pennsylvanian.

GODFREY'S MONUMENT.

The Mercantile Library Association having, with commendable spirit and liberality, provided an appropriate monument to be placed at Laurel Hill, over the remains of Thomas Godfrey, the celebrated inventor of the quadrant, an address was delivered on the occasion, yesterday afternoon, at the chapel of that cemetery, by Dr. Emerson. A numerous audience assembled to hear the remarks of the speaker, including the members of the company, and many ladies and citizens who where present by invitation. Dr. Emerson gave a brief but highly interesting sketch of Godfrey and of his invention, showing in the clearest manner that he was entitled to full credit in regard to the matter of the quadrant, and making it evident that there was a cotemporary disposition abroad to deprive both Godfrey and his country of the honor of having afforded so important an advantage to navigators. The address gave many details, which were heard with much satisfaction, and was both written and delivered in a very happy manner. We presume that a paper so well calculated to attract attention, and to form a valuable chapter in our local history, will speedily be published in a form likely to bring it within general reach, and we, therefore, refrain from giving more at present than a glance at the nature of its contents. It may not be amiss, however, to add, that it was in every respect worthy of the high character of its author, and that it demands a careful perusal from all who feel pride in the scientific fame of Philadelphia.

The monument now erected to honor Godfrey's memory consists of a pedestal surmounted by an obelisk, composed of white marble from the Oakland quarries, Chester county, designed and executed by John Struthers & Son. It is eleven feet in height, and the extreme width of the base is four feet. One face of the obelisk is ornamented with the represen-

tation of a quadrant beautifully sculptured in *alto relievo*, and the opposite face with a ship under full sail in *basso relievo*. The entire monument is graceful, simple, and appropriate to its purpose. Godfrey's remains, with those of his family, were originally interred in a field near Germantown, which, in the course of time, has had various owners, and been used for different purposes; in consequence of which the simple slab which marked the grave had been much injured, and was in danger of being completely destroyed. Some years since, John F. Watson, Esq., the annalist of Philadelphia, feeling a commendable interest in the matter, had the ashes of Godfrey, and of his immediate relatives, removed, at his own expense, to Laurel Hill, and he also placed over them a stone appropriately inscribed, which has now been superseded by the library company's elegant monument. The inscriptions are as follows:

GODFREY.

PALMAM QUI MERUIT FERAT.

—

THOMAS GODFREY,

INVENTOR OF THE MARINERS' QUADRANT,

A Citizen of Philadelphia.

Born, 1704. Died, 1749.

—

His Invention

Has conferred enduring benefit

UPON THE MARINE AND COMMERCE

OF THE

WORLD.

—

ERECTED

A. D. 1843,

BY THE MERCANTILE LIBRARY COMPANY

of Philadelphia,

Aided by Citizens of Philadelphia and Germantown.

STEAMERS FOR THE REVENUE SERVICE.—We have before announced that six iron steamers would be constructed this season for the United States revenue service; we are now able to give a few particulars of their proposed dimensions, plans of machinery, rig, &c. Each vessel will be 140 feet in length, have 40 feet beam, and 10 feet depth of hold, and engines of 150 horse power. The engines of four of them will be on the plan of Lieut. Hunter, U. S. N., and those of the other two on the plan of Errickson's single propeller. They will each have three masts, and be fore and aft rigged. It is intended that they shall be complete in their sailing equipments as it is contemplated to use the steam power only in cases of necessity. They will be so constructed, that, if necessary, each vessel will be capable of carrying four long 68-pounders, (Paixhan guns;) but their usual armament will consist of one long 32-pounder on a swivel, amidships. Four of these vessels are intended for the sea-board, one for Lake Erie, and the other for Lake Ontario; one will be built at Alger's yard, South Boston; one at Novelty Works, New York; one at Dunham's foundry, New York; one at Cold Spring, Hudson river; and two at Pittsburg, Pa. Captain Howard, well known in this community as an intelligent and enterprising commander, will superintend their construction. He came in the U. S. steamer Union, from Norfolk, and intends remaining on board of her during her experimental cruise, with the view of obtaining practical information that will enable him to remedy, in the construction of the vessels under his charge, what he may discover deficient in the Union. So far Captain Howard expresses himself satisfied of the ultimate triumph of Lieutenant Hunter's plans over those of all others that have yet been adopted by the navy.—*Boston Post.*

ARMY.

CIRCULAR. { HEADQUARTERS OF THE ARMY,
ADJUTANT GENERAL'S OFFICE,
Washington, May 31, 1843.

The attention of all officers of the army is specially directed to *paragraph* 1,292 of the general regulations relative to whiskers, moustaches, and cut of the hair, respecting which the Secretary of War, to whom the subject has been submitted, deems it inexpedient to direct any modification. Accordingly all commanders and inspectors are hereby directed to enforce the said regulations.

BY COMMAND OF MAJOR GENERAL SCOTT:

R. JONES, *Adjutant General.*

NAVY.

May ORDERS.

31—P. Mid. W. Reid, receiving-ship, New Orleans.
P. Mid. H. A. Wise, rec. ship, New Orleans.
Mid. W. S. Cushman, ship Independence.
Mid. R. H. Getty, Depot of Charts &c.

June.

1—Lieut. J. K. Bowie, Inspector of provisions and clothing.
Master's Mate T. M. Crooker, rec. ship Boston.
Mid. C. Benham, ship Independence.

2—Comm'r W. M. Armstrong, detached from command of sloop Marion, and waiting orders.
P. Mid. M. Rush, detached from sloop Marion, with leave three months.
P. Mid. J. Q. Adams, sloop Decatur, acting master.
Mid. G. H. Cooper, A. C. Rhind, and A. K. Hughes, frigate Macedonian.
Mid. A. W. Johnson, deta'd from sloop Marion, with one month's leave.

3—Lieut. C. H. Davis, command of schooner Vanderbilt, on coast survey under Lieut. Blake.
P. Mid. A. H. Jenkins, furlough three months.
Mid. F. A. Parker, ship Independence.
Carpenter J. A. Dickason, navy-yard, Boston.

5—Lieut. J. McCormick, frigate Macedonian.
Ass't Sur. J. Hopkinson, rec. ship, Norfolk.
Boatswain E. Crocker, detached from receiving-ship, Norfolk.

May. APPOINTMENT.

31—Thomas Dickson, 3d Assistant Engineer.

May. MARINE CORPS.

1—2d Lieut. W. W. Russell, appointed aid-de-camp to the Brigadier General commandant.

5—1st Lieut. H. B. Tyler's order to the Columbus 74 suspended, he being required as a witness before a court martial to be ordered.

6—1st Lieut. W. E. Stark, to charge of clothing store at Norfolk, and to attend to such other duties on that station as may be required by the staff of the corps.

8—2d Lieut. D. J. Sutherland to headquarters for duty; joined on the 13th.

9—Lieut. W. L. Shuttleworth, to navy-yard, Pensacola.

10—1st Lieut. G. H. Terrett, to the Mediterranean, to take charge of and distribute clothing and other stores on that station.
16—2d Lieut. A. S. Taylor, to steamer Missouri.
June.
1—2d Lieut. J. Watson. to navy-yard, Philadelphia.

Naval Intelligence.

U. S. VESSELS OF WAR REPORTED.

Steamer *Union*, Lieut. Comd't Hunter, left Boston on Tuesday, 30th ult., and arrived at New York on Friday.

Brig *Oregon*, Lieut. Comd't Powell, engaged on the surveying expedition, put into Apalachicola on the 22d ultimo, and was to leave again on the 25th. Officers and crew all well.

Home Squadron.—Captain Isaac McKeever assumed the command of the flag-ship *Independence*, at New York, on Friday morning last.

Wm. H. Storms, an apprentice, fell from the spar to the main deck of this ship on Saturday evening, and expired at half-past three on Sunday afternoon. Every effort was made to restore him to consciousness, but without effect. He has relatives in the city of New York.

Sloop *Vincennes*, Commander Buchanan, sailed from Pensacola May 24, on a cruise.

Brig *Somers*, Lieut. Comd't West, arrived at Savannah on Friday last, in 12 days from Norfolk, having encountered head and light winds all the way.

African Squadron.—Ship *Saratoga*, bearing the broad pendant of Commodore M. C. Perry, dropped down on Wednesday to the North river, New York, and will sail in a few days for the coast of Africa. We annex a list of her officers:

Commander Josiah Tattnall; Lieutenants, C. M. Armstrong, C. Heywood, C. S. Boggs, B. S. B. Darlington, and E. G. Parrott; Surgeon, Horatio N. Glentworth; Purser, Horatio Bridge; Acting Master, George Wells; Commodore's Secretary, Wm. P. Rodgers; Lieut. Marines, I. T. Doughty; Assistant Surgeon, C. J. Bates; Passed Midshipmen, I. C. Wait and G. W. Rodgers; Midshipmen, H. S. Newcomb, J. P. Hall, C. C. Hunter, E. W. Henry, A. Deslonde, E. D. Wall, W. S. Cushman, O. C. Badger, and D. A. Chever; Captain's Clerk, A. W. Russell; Purser's Clerk, B. F. Ferris; Boatswain, W. C. Burns; Gunner, John Barr; Carpenter, L. Manson; Sailmaker, Benjamin B. Burchstead.

REVENUE CUTTERS.

ORDERS.

May 20—3d Lt. E. C. Kennedy, Hamilton, Boston.
2d Lieut. J. G. Bushwood, Taney, Norfolk.
June 2—Captain Thos. C. Rudolph, relieved from duty—sick.
June 1—Revenue cutter Taney, ordered to New York for repairs, and the cutter Wolcott from Baltimore to Norfolk, to supply the place of the Taney during her absence.

LETTERS ADVERTISED.

Washington, *June* 1, 1843.

Army.—Lieut. J. H. Carleton, Capt. M. S. Howe, Col. H. Stanton.

Navy.—Mid. W. B. Browne, Mid. H. A. Colborn, P. Mid. J. C. Henry, P. Mid. H. Rolando, Commo. A. S. Wadsworth.

Marine Corps.—Capt. J. Edelin, 3.

Norfolk, *June* 1, 1843.

Commo. Parker, Comm'r Buchanan, Lieutenants W. W. Bleecker, J. H. Adams, C. C. Barton, 2; A. H. Foot, G. K. Gray, Wm. W. Green, N. M. Howison, —— Gray, 2; Wm. May, J. S. Palmer, G. T. Sinclair, P. Turner, W. M. Walker. Doctors R. Banister, W. T. Bishop, J. J. Brownlee, M. G. Delany, A. W. Hughes, Geo. Terrell. Rev. George Jones, 7; Passed Mid. F. Alexander, 2; C. Deas, A. Murray, 2; G. H. Preble, H. P. Robertson. Midshipmen C. P. Jones, C. Hunter, A. A. Semmes, J. H. Somerville, 2; J. D. Read, E. E. Stone, W. H. Weaver.

New York, *June* 1, 1843.

Army.—Lieut. Keyes, Lieut. J. H. Miller, Lieut. Rosecrans, Lieut. R. Somers Smith.

Navy.—Lieut. J. F. Armstrong, Dr. J. J. Abernethy, Mid. A. Barbot, Acting Master W. B. Beverley, Boatswain W. Brady, Lieut. I. N. Brown, Boatswain A. Colson, P. Mid. J. K. Duer, Mid. R. C. Duvall, Purser H. Etting, 2; Mid. J. Foster, Lieut. G. Ganscvoort, Capt. F. H. Gregory, Lieut. A. A. Harwood, 2; Mid. J. E. Hart, C. W. Hays, Capt. U. P. Levy, Mid. W. R. Low, Lieut. W. May, Dr. J. M. Minor, Capt. W. J. McCluney, Professor B. McGowan, C. H. Geo. Noland, Lieut. E. Peck, Purser R. M. Price, 2; Lt. G. T. Sinclair, Mid. J. Stewart, Rev. C. Stewart, Mid. E. Thompson, Dr. W. Turk, Lieut. J. W. West, 2.

Marriages.

In Baltimore, on Thursday, the 25th ult., in St. Vincent of Paul's Church, Lieut. L. B. NORTHROP, U. S. army, of South Carolina, to MARIA, grand-daughter of the late Chevalier de Bernabeu, of that city.

In Boston, on Monday morning, 29th ult., at the Church in Purchase street, Mr. Edward L. Keyes to Miss Lucy, daughter of the late Col. A. S. Brooks, U. S. A., and grand daughter of the late Governor Brooks, of Medford.

In Norfolk, on Thursday morning, May 30, Mr. John Pursell, of Richmond, to Miss Martha, second daughter of Captain Thomas T. Webb, U. S. navy.

In New York, on the 1st inst., Dr. WILLIAM MAFFITT, Assistant Surgeon U. S. A., to JULIA, daughter of P. Chouteau, jr., Esq., of St. Louis, Missouri.

FOR SALE AT THIS OFFICE.

SYNOPSIS OF THE CRUISE OF THE EXPLORING EXPEDITION, by its Commander, Lt. Charles Wilkes, with a chart, showing the tracks of the vessels.

BITUMEN: its varieties, properties, and uses, compiled from various sources, by Lieut. H. Wager Halleck, U. S. Corps of Engineers, under the direction of Col. J. G. Totten, Chief Engineer.

SUMMARY OF THE PRINCIPAL CHINESE TREATISES upon the culture of the Mulberry and the rearing of Silk Worms. Translated from the Chinese.

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